



Developing Computational Fluency in Addition and Subtraction

Kathy Ernst



An appropriate motto for a Japanese teacher would be, “structured problem solving.”

In the United States, the motto is, “learning terms and practicing procedures.”

James W. Stigler and James Hiebert, *The Teaching Gap: Best ideas from the World's Teachers for Improving Education in the Classroom* (New York, NT: The Free Press, 1999)

OVERHEAD #3



**When children *invent* procedures, they
construct *understanding* of mathematics.**



A Good Problem Solver Is...

- **CURIOUS.....**Wonder about things, ask questions, explore to find out more!
- **FLEXIBLE.....**Look for different ways to solve a problem.
- **PERSISTENT.....**Don't give up easily. Take time to think and keep on trying.
- **A RISK TAKER.....**Try new or challenging things. Don't be afraid to make mistakes—they are learning opportunities!
- **REFLECTIVE.....**Take time to think about what you're doing, why you're doing it, whether it makes sense, and how you can do it better.

Guidelines for Problem-Solving



- **Help each other do your best thinking.**
- **Give help or a hint *only* if the learner wants it. (Would you like help; a hint?)**
- **Help the learner discover solutions and mistakes. (How did you get that? Show me how you figured it out.)**
- **If you disagree with someone's solution or method, ask him how he got it. If you still disagree, tell him why. Politely explain your own thinking.**

Computational Fluency



EFFICIENCY

ACCURACY

FLEXIBILITY

Susan Jo Russell, *Relearning to Teach Arithmetic: Addition and Subtraction*. (Parsippany, NJ: Dale Seymour Publications, 1999).



On Saturday, I walked in the park and saw 39 tulips blooming. On Sunday I saw 54 more tulips blooming. How many tulips did I see in bloom?

After the rainstorm, I saw 100 earthworms on the sidewalk. At recess, I saw only 67 worms. How many worms disappeared?



I was on the 28th floor of a very tall building in New York City. I went on the elevator and got out at the 72nd floor. How many floors did I travel on the elevator?